Restoring a Legacy at Red River National Wildlife Refuge

A Forestland Restoration Partnership Between the US Fish and Wildlife Service and The Conservation Fund's Go Zero® Program

Project Design Document

Prepared by:

The Conservation Fund

With contributions from:

United States Fish and Wildlife Service

Environmental Synergy Inc.

EXECUTIVE SUMMARY

This Project Design Document is prepared for the Red River National Wildlife Refuge Restoration Initiative to meet the Climate, Community, and Biodiversity Standard. The Red River National Wildlife Refuge Restoration Initiative is a unique opportunity to restore native hardwood forests that will benefit fish and wildlife, enhance water quality along the Red River and surrounding waterways, create new areas for public recreation, and trap carbon dioxide.

On behalf of the US Fish and Wildlife Service, the nonprofit Conservation Fund intends to purchase a total of 1,182 acres of private, marginal agricultural land within the boundary of the Red River National Wildlife Refuge located in Natchitoches Parish in northern Louisiana. Using donations from its Go Zero® program, the Fund will restore the entire acreage to its native bottomland hardwood forest habitat in two phases, beginning in January of 2009. Once restored, the land will be conveyed to the US Fish and Wildlife Service as an addition to the Red River National Wildlife Refuge for long-term protection and stewardship. The carbon offsets that are generated and purchased from this project will be retired and cannot be sold or banked for future offset purposes.

This project has been designed to:

- decrease the effects of climate change via carbon sequestration;
- restore Louisiana's bottomland hardwood forest and wetland ecosystem; and
- create long-term community benefits in the form of recreational lands under the management of the US Fish and Wildlife Service – hunting, fishing, wildlife photography, wildlife observation, environmental education and environmental interpretation.

Since 2005, the Fund's Go Zero program has helped to engage Fortune 500 companies, their customers and employees, as well as other organizations and individuals seeking a positive response to two of our nation's most pressing environmental challenges: habitat loss and climate change. In a time when public financing for land conservation and habitat restoration are at historic lows, voluntary contributions are providing new private capital that is used to further the Fund's mission to conserve and restore our nation's land and water legacy for current and future generations. From these Go Zero projects, the nation derives—and will continue to receive for many years into the future—significant public benefits, including cleaner air, filtered water, restored sensitive wildlife habitat and enhanced areas for public recreation.

All of the Fund's forest-based carbon sequestration activities are conducted exclusively with state and federal natural resource agencies, including the US Fish and Wildlife Service. These organizations employ some of the world's top wildlife biologists, foresters, and environmental professionals who serve as long-term stewards and monitors of the forests once they are restored. In March of 2007, the Fund and the US Fish and Wildlife Service entered into a Memorandum of Understanding that allowed all 548 of the Services' National Wildlife Refuges

to benefit from the Fund's Go Zero program, building upon nearly a decade of partnership between the Fund and the US Fish and Wildlife Service to advance the science of carbon sequestration through reforestation.

The Fund's carbon sequestration programs, including, but not limited to Go Zero, have helped to restore 20,000 acres with 6 million trees which will capture an estimated 7.2 million tons of carbon dioxide equivalent from the atmosphere over their lifetime. Much of this activity has taken place on National Wildlife Refuge lands.

The National Wildlife Refuge System Improvement Act of 1997 requires each refuge to develop a Comprehensive Conservation Plan for achieving refuge objectives consistent with sound principles of fish and wildlife management, conservation, legal mandates, and Fish and Wildlife Service policies. The National Environmental Policy Act requires each plan to examine a full range of alternative approaches to refuge management and to involve the public in selecting the approach best suited to each refuge's purposes. This Project Design Document will expand upon many of the stewardship and management activities prescribed in the Red River Comprehensive Conservation Plan.

Building on decades of experience and expertise, the Red River National Wildlife Refuge Restoration Initiative also benefits from our partnership with Environmental Synergy Inc., an Atlanta-based company providing afforestation and carbon quantification services to clients as a means to offset carbon dioxide emissions and promote sustainable forestry. They have planted more indigenous trees in the United States, on more acres of land, for the purpose of carbon sequestration than any other organization in the nation.

Over the course of the last century, we have lost more than 24 million acres of bottomland hardwood forest along the Red River and lower Mississippi River valleys, primarily for land use conversion to agriculture. Habitat destruction is more pronounced here than in any other area of the United States. Due to the geological challenges of farming in a floodplain, combined with changing market forces, agricultural landowners are increasingly interested in alternatives, providing significant opportunity for acquisition and restoration of vast acreage back to its original bottomland habitat. Restoring these lands—especially at Red River—is now one of The Conservation Fund's highest priorities, leaving our communities with cleaner air, cleaner water, and restoring biodiversity for wildlife and people alike.

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EXHIBITS

G1. ORIGINAL CONDITIONS AT PROJECT SITE

G1.1 Location and Basic Physical Parameters

The Red River National Wildlife Refuge Act, which was signed into law on October 13, 2000, authorized the establishment of the Red River National Wildlife Refuge ("Red River NWR") to provide for the restoration and conservation of fish and wildlife habitats in the Red River Valley ecosystem. Red River NWR is situated in the West Gulf Coastal Plain of the Lower Mississippi River Valley, in the heart of bottomland hardwood forest and wetlands in northern Louisiana.

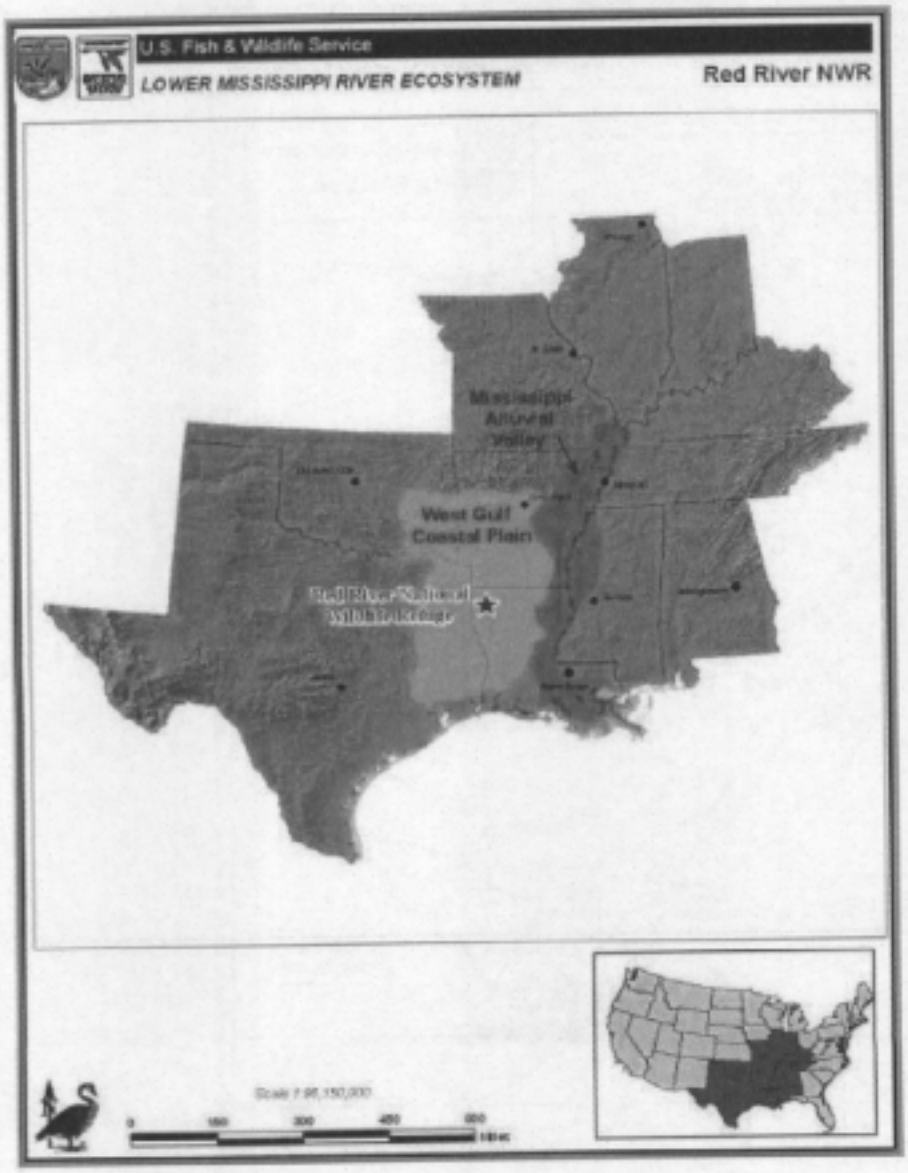

Figure 1: Map of Lower Mississippi River Valley and Red River National Wildlife Refuge

According to the Act, Red River NWR shall consist of approximately 50,000 acres of federal lands and waters along the section of Red River between Colfax, Louisiana and the Arkansas state line, a distance of approximately 120 miles. Red River NWR was officially established on August 22, 2002, with the initial purchase of 1,377 acres in the Spanish Lake Lowlands Focus Area. It consists of five units: Headquarters Unit in Bossier Parish, Wardview Unit in Caddo and Bossier Parishes, Bayou Pierre Unit in Red River and De Soto Parishes, and Spanish Lake Lowlands and Lower Cane River Unit in Natchitoches Parish. Currently, fee title lands have been purchased within portions of all the focus areas except Wardview.

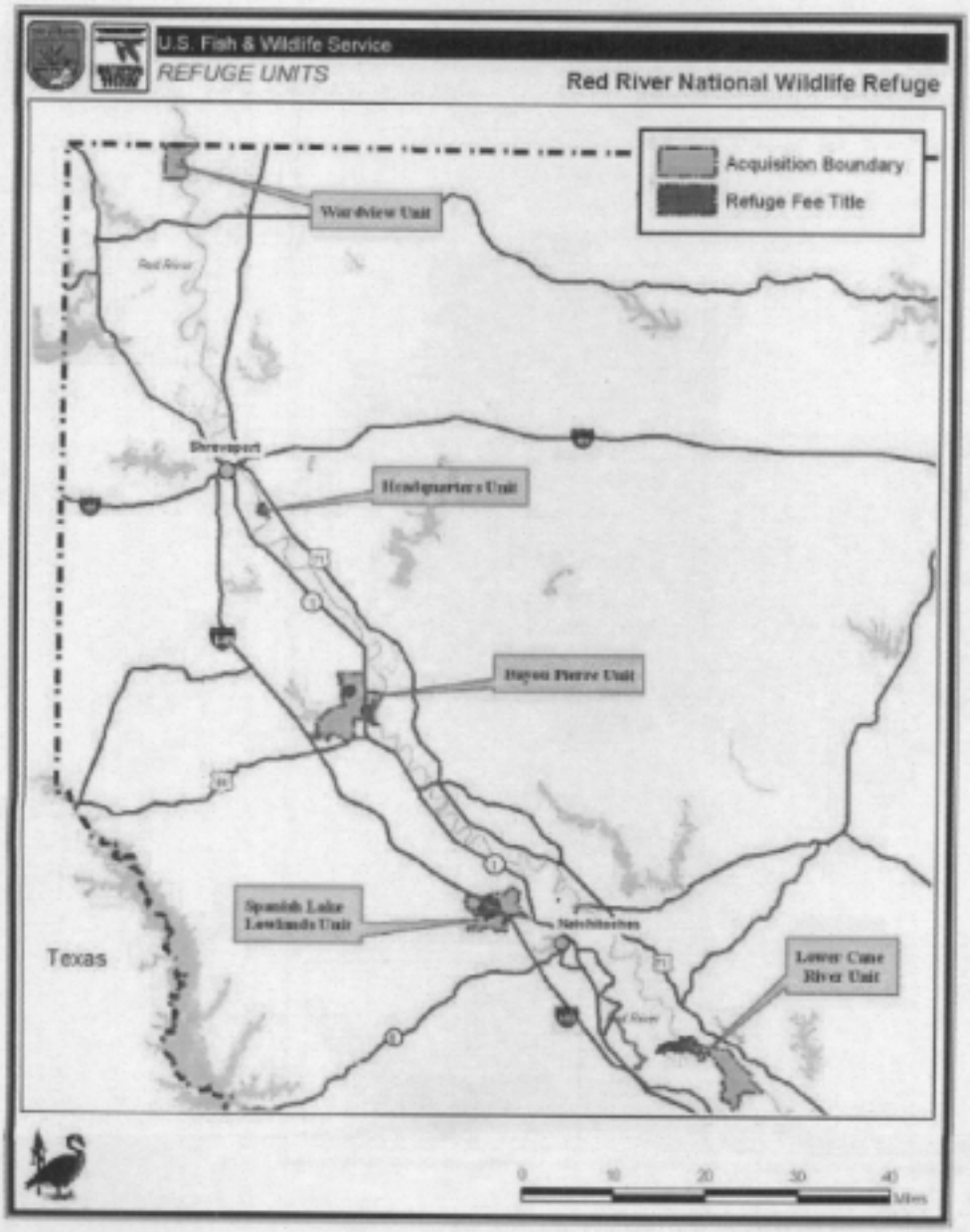

Figure 2: Map of Lower Mississippi River Valley and Red River National Wildlife Refuge

Red River NWR is a relatively new refuge, located in an area that was historically forested, but is now mostly cleared. Red River NWR management is currently very active in land acquisition and desires to reforest much of the acquired land. However, these processes are expensive and often run up against budget constraints. A public/private sector partnership has emerged as one solution to the budgetary challenge.

The Go Zero Tract

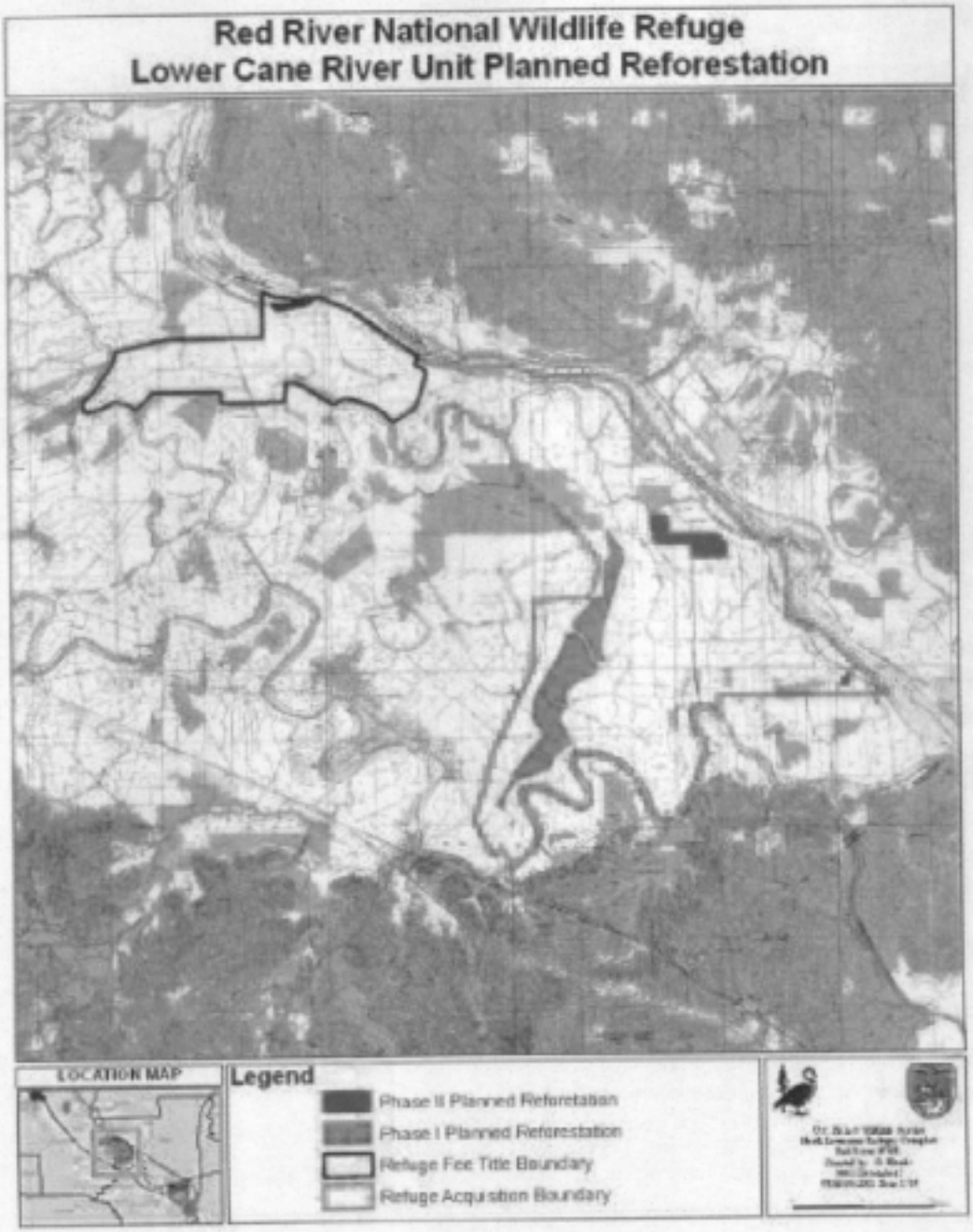

Figure 3: Map of Red River National Wildlife Refuge's Lower Cane River Unit

In October 2008, The Conservation Fund ("the Fund") completed the first phase of its Red River National Wildlife Refuge Restoration Initiative ("Red River Restoration Initiative") with the acquisition of 922 acres of private, marginal agricultural land in the Lower Cane River Unit in Natchitoches Parish, about 20 miles north of Alexandria, Louisiana (the "Go Zero Tract" or "the Tract"). The second phase will encompass the acquisition of an additional 260 acres. The Fund will restore these 1,182 acres with native bottomland hardwoods and then convey them to the United States Fish and Wildlife Service ("USFWS" or "the Service") as an addition to Red River NWR. Restoration of the first phase will commence in January 2009, with expected conveyance to USFWS in the second or third quarter of 2009.

The second phase of the project is approximately 260 acres. The current landowner has retained the right to use this land through fall 2009. The Fund is under contract to acquire the 260 acres in fall 2009 and will begin restoration in early 2010. The Phase 2 parcel will be conveyed to the Service in late 2010.

Climate

The climate at Red River NWR is humid-subtropical and influenced by its subtropical latitude and proximity to the Gulf of Mexico.[1] The climate is characterized by hot, sultry summers and moderately cool winters. The average temperature in the summer months is 81 degrees, with temperatures above 90 degrees occurring almost daily. During the winter, the average temperature is 50 degrees and average seasonal snowfall is less than one inch. Mean annual precipitation is 60 inches, as illustrated in Figure 4,[2] and half of this rainfall usually falls between April and September, which is the primary growing season.

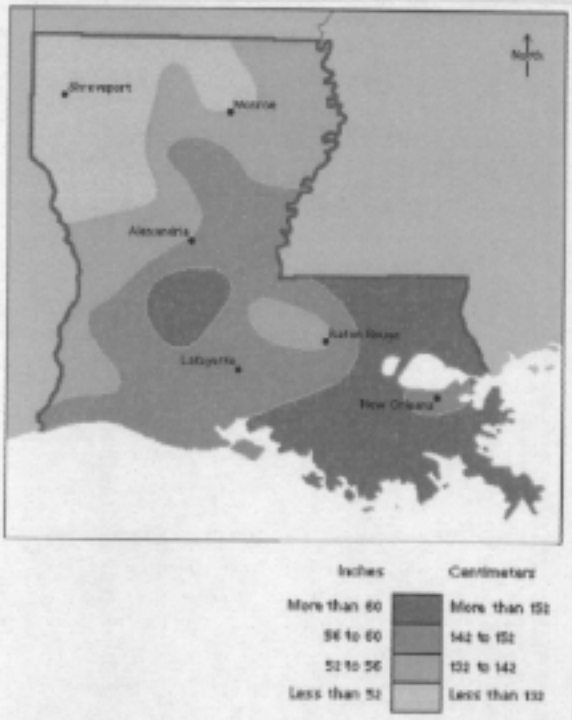

Figure 4: Average Yearly Precipitation in Louisiana

[1] Red River National Wildlife Refuge Comprehensive Conservation Plan [hereinafter "Red River CCP"], *available at*: http://www.fws.gov/southeast/planning/RedRiverFinalPg.html

[2] World Book Encyclopedia, *available at*: http://www.worldbook.com/wb/Students?content_spotlight/climates/north_american_climate_louisiana

Geology and Topography

The topography of the area has been greatly influenced by the actions of the Red River. The Red River has a narrow floodplain, averaging 6-8 miles in width, and previously carried glacial meltwaters and outwash in a braided stream pattern that concurrently widened and aggraded the valley during periods of decreasing glaciations. As the glacial cycles continued and sediment loads declined, the river abandoned its braided stream configuration and took a single-channel pattern. The alluvium has been sorted, reworked, and deposited many times by river processes.

The lands in the valley are generally classified as alluvial floodplain or terrace uplands. Channels and natural levees are easily seen by visitors to Red River NWR. Human disturbances, including artificial levees and channelization, have drastically altered these natural alluvial processes within the Red River floodplain.

Elevation averages 150 feet above sea level at Red River NWR's lower end below Natchitoches to 250 feet near the Arkansas border. The topography is complex, with numerous stream channels, small tributaries, multiple river terraces in various stages of erosion and deposition, and adjacent poorly drained lowlands. Added to this complexity are farming activities that have modified the hydrology of the area, resulting in a topography that has given rise to diverse flora and fauna.[3]

Soils and Hydrology

The soils on and surrounding Red River NWR historically supported a diverse bottomland hardwood forest. The soils of the floodplains range from loamy to clayey and from well-drained to very poorly drained. The loamy soils are on higher ground, and these soils are fertile and have few limitations for crops. The clayey soils, which are in lower areas, are flooded by runoff and stream overflow and limited by wetness.

The Red River basin comprises the largest drainage area in Louisiana, and drainage is into the Gulf of Mexico. The Red River joins with the Atchafalaya and Old Rivers, and most of the water from the Red River flows to the Gulf through the Atchafalaya system. Because of the extensive artificial levee system, there is not much drainage directly into the Mississippi within the state.[4]

High turbidity levels, wide fluctuations in river depth, and edge-to-edge farm practices had dramatic impacts on the carrying capacity of the land for wildlife. In 1964, Congress authorized the Red River waterway project, which was completed in 1994 and consists of five locks and dam complexes located between the Old River Lock on the Mississippi to a point just south of Shreveport. This began to change the water quality at Red River, which is now somewhat improved and turbidity has reduced. Water quality should continue to improve as a result of

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[3] Red River CCP, *available at*: http://www.fws.gov/southeast/planning/RedRiverFinalPg.html

[4] Red River CCP, *available at* http://www.fws.gov/southeast/planning/RedRiverFinalPg.html

the restoration of the Go Zero Tract as native trees filter nutrients and slow sedimentation and erosion.

G1.2 Vegetation

The predominant natural vegetation throughout Red River NWR and the surrounding area is bottomland hardwood forest. Bottomland hardwood forests are river swamps that are found along rivers and streams of the southeast and south central United States, generally in broad floodplains. These ecosystems are commonly found wherever streams or rivers at least occasionally cause flooding beyond their channel confines. They are deciduous, forested wetlands made up of different species of gum and oak and bald cypress, which have the ability to survive in areas that are either seasonally flooded or covered with water much of the year. Identifying features of these wetland systems include the fluted or flaring trunks that develop in several species and the presence of knees or aerial roots.[5]

Specifically, bottomland hardwood forests in this area can be classified into four primary habitat types:

- Baldcypress – water tupelo
- Overcup oak – water hickory
- Sweetgum –willow oak
- Swamp chestnut oak – cherrybark oak[6]

Two hundred years ago, bottomland hardwood forests covered almost thirty million acres across the Southeastern United States. Now only about forty percent of that area currently supports these unique ecosystems. It is estimated that losses of these swamps reached rates as high as 431,000 acres per year from 1965 to 1975, largely due to conversion to croplands, particularly soybeans.[7] These losses made the Red River Valley one of the most environmentally degraded floodplains in Louisiana.

The Go Zero Tract, like much of the lower Mississippi floodplain, was cleared for farmland several decades ago. The primary vegetation now found on the Tract includes agricultural crops such as rice, corn and soybeans.

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[5] Environmental Protection Agency, Wetland Types, Bottomland Hardwoods, *available at* http://www.epa.gov/owow/wetlands/types/bottomland.html

[6] Red River CCP, *available at* http://www.fws.gov/southeast/planning/RedRiverFinalPg.html

[7] Environmental Protection Agency, Wetland Types, Bottomland Hardwoods, *available at* http://www.epa.gov/owow/wetlands/types/bottomland.html

G1.3 Current Carbon Stocks at the Project Site

The global climate change benefits of reforestation projects are widely recognized. Land use change—especially deforestation—is a significant component of increasing atmospheric CO_2 levels and a cause of global warming.[8] Thus, restoring forestland represents a natural way to reduce these effects and combat climate change.

The climate and soil conditions in the Lower Mississippi River Valley contribute to carbon sequestration rates that are among the highest in the United States. Over its lifetime, each Go Zero tree planted here is expected to sequester more than one ton of carbon dioxide equivalent from the atmosphere. The carbon impact of the Red River Restoration Initiative is estimated at 361 short tons of carbon dioxide equivalent per acre over one hundred years.[9]

The assumption for pre-project carbon stocks (i.e., on the agricultural lands prior to reforestation) is that the woody biomass carbon stocks are zero. Non-woody (herbaceous) biomass is neglected and assumed to be constant in the baseline and the "with-project" scenario so there is no need to quantify it. Therefore, the only significant current carbon stock at the project site is the soil carbon. The project monitoring protocol includes soil measurements from which future gains can be observed, essentially setting a zero baseline at project outset.

G1.4 Communities Located in and Around the Project Area

Red River NWR is divided into five separate units spread over 120 miles of the Red River Valley from the Arkansas/Louisiana state line to near Alexandria, Louisiana. The refuge units are located in parts of Caddo, Bossier, DeSoto, Red River and Natchitoches Parishes in Louisiana. Four of the refuge units are in a rural setting; the fifth one is located in the major metropolitan area of Shreveport and Bossier City. In 2006 the population of Louisiana was 4,287,768 and the population of Natchitoches Parish was 38,719.[10]

According to the 2000 Census data, the median household income for Natchitoches was $25,722.[11] The average median household income for Louisiana in 2000 was $32,566;[12] the

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[8] IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[9] Shoch, D., Kaster, G., Hohl, A. and R. Souter. In press. Carbon sequestration potential of bottomland hardwood afforestation in the Lower Mississippi Valley, U.S.A. Wetlands; Smith, J.E., Heath, L.S., Skog, K.E. and R.A. Birdsey. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. USDA Forest Service, Northeastern Research Station. Newtown Square, Pennsylvania, USA. Gen. Tech. Rep. NE-343.

[10] U.S. Census Bureau Quickfacts, *available at* http://quickfacts.census.gov/qfd/states/22/22069.html

[11] U.S. Census Bureau 2000 Demographic Profiles, *available at*: http://censtats.census.gov/data/LA/05022069.pdf

[12] U.S. Census Bureau 2000 Demographic Profiles, *available at*: http://censtats.census.gov/data/LA/04022.pdf

median for the United States was $41,994.[13] In 2004, the median household income in Natchitoches Parish was $28,309 and the median household income in Louisiana was $35,216.[14] The median household income for the United States in 2004 was $44,334.[15] Overall, Louisiana generally ranks among the poorest states in the nation.

Education

The Natchitoches Parish School System includes 15 public schools (covering grades K-12).[16] The two public high schools include Natchitoches Central High School in Natchitoches and Lakeview High School located in a nearby unincorporated area. Approximately 72.7% of residents over the age of 25 are high school graduates and 18.4% of residents have completed a bachelor's degree or higher.[17] In Louisiana, 74.8% of residents over 25 are high school graduates and 18.7% have completed a bachelor's or higher,[18] and in the United States, 80.4% of residents over 25 are high school graduates and 24.4% have completed a bachelor's or higher.[19]

G1.5 Current Land Use and Land Tenure at the Project Site

The Go Zero Tract was previously privately owned, marginal farmland. Agricultural crops including rice, soybeans, and corn were grown on the land. As previously stated in G1.1, the Fund acquired 922 acres in 2008, the first phase of the Red River Restoration Initiative, and intends to restore it with native bottomland hardwood forest in early 2009. The Fund plans to acquire the second parcel in the Go Zero Tract in Fall of 2009 and the planting process will take place in early 2010. After reforestation, the entire Tract will be managed by USFWS as forestland.

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[13] U.S. Census Bureau 2000 Demographic Profiles, *available at*: http://censtats.census.gov/data/US/01000.pdf

[14] U.S. Census Bureau, State and County Quickfacts, Natchitoches Parish, Louisiana, *available at*: http://quickfacts.census.gov/qfd/states/22/22069.html

[15] U.S. Census Bureau, Quickfacts, *available at*: http://quickfacts.census.gov/qfd/states/00000.html

[16] Natchitoches Parish School Board, *available at*: http://www.nat.k12.la.us/schools_main.html

[17] U.S. Census Bureau, State and County Quickfacts, Natchitoches Parish, Louisiana, *available at*: http://quickfacts.census.gov/qfd/states/22/22069.html

[18] US Census Bureau, State and County Quickfacts, Natchitoches Parish, Louisiana, *available at*: http://quickfacts.census.gov/qfd/states/22/22069.html

[19] U.S. Census Bureau, Quickfacts, *available at*: http://quickfacts.census.gov/qfd/states/00000.html

G1.6 Current Biodiversity in the Project Area

In addition to carbon sequestration objectives, a primary goal of the Fund in reforesting the Go Zero Tract is to restore biodiversity, native ecosystems and enhance habitat for fish and wildlife within the project area. The Red River is a historic migration corridor for migratory birds and more than 300 species of neotropical migratory birds use Red River NWR at various times of the year. It is also an important region for migrating and wintering ducks and geese. Forty-four species of mammals occur on the refuge including white-tailed deer, swamp rabbit, cottontail rabbit, gray and fox squirrels, muskrat, beaver, fox and coyote. Several species of bats occur at Red River NWR along with a variety of amphibian and reptiles. The river basin supports 133 species of fish, ranging from game species, such as largemouth bass, crappie and catfish, to big river species such sturgeon, freshwater drum, and gar.[20]

Figure 5: Short-eared owl

There is currently not a wide range of biodiversity on the Go Zero Tract itself because the land was recently used for agriculture. Once the land is reforested it will rapidly begin to enhance biodiversity for many species identified above. The young tree seedlings planted at the Go Zero Tract will immediately offer shelter for blackbirds, meadowlarks, dickcissels and sparrows. Bobwhite quail and short-eared owls will also enjoy this early successional habitat. Within ten years, these young forests will be home to nesting blue grosbeaks, orchard orioles and yellow-breasted chats. The forest will then provide thick cover for resident wildlife as well, including deer and rabbits. In the future, this mature bottomland hardwood forest will be alive with prothonotary and hooded warblers, pileated woodpeckers and wintering woodcock. Bats will hunt the forest at night, along with bobcats, coyotes and raccoons.

G1. 7 IUCN Red List Threatened Species

The data below were collected from several sources including the International Union for Conservation of Nature (IUCN),[21] USFWS,[22] and the Rare, Threatened and Endangered

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[20] Red River CCP, *available at:* http://www.fws.gov/southeast/planning/RedRiverFinalPg.html

[21] The IUCN Red List of Threatened Species, *available at:* http://www.iucnredlist.org/

[22] U.S. Fish and Wildlife Endangered Species Program, *available at:* http://www.fws.gov/endangered/

Species List tracked by the Louisiana Natural Heritage Program.[23] The IUCN has a much broader approach to listing endangered and threatened species because it is done on a global scale and as a result, one of the endangered species listed by the USFWS was listed as a "least concern" species by the IUCN. The table below shows the threatened and endangered species found at Red River NWR.

Table 1: Threatened or endangered species found on the refuge.

Common Name	Species Name	US Federal Rating	Louisiana Rating	IUCN Rating
Alligator Snapping Turtle	*Macrochelys temminckii*			Vulnerable
Bald Eagle	*Haliaeetus leucocephalus*	Delisted	Endangered	Least Concern
Interior Least Tern	*Sterna antillarum*	Endangered	Endangered	Least Concern
Louisiana Slimy Salamander	*Plethodon kisatchie*		Imperiled	Least Concern
Rusty Blackbird	*Euphagus carolinus*			Vulnerable

Species of Concern

In addition to the species identified on the Red List or by the federal and state wildlife agencies, the Comprehensive Conservation Plan ("CCP") for Red River NWR has identified priority bird species for conservation including the cerulean warbler, Swainson's warbler, swallow-tailed kite, American woodcock, yellow-billed cuckoo, Kentucky warbler, hooded warbler and the endangered interior least tern. Three other species of special concern noted

Figure 6: Interior least tern

[23] Rare, Threatened and Endangered Species and Natural Communities Tracked by the Louisiana Natural Heritage Program, Natchitoches Parish, April 2008, *available at:* http://www.wlf.louisiana.gov/pdfs/experience/naturalheritage/natchitoches.pdf

in the CCP are the alligator snapping turtle, the Louisiana slimy salamander and the western worm snake. The alligator snapping turtle, listed on the IUCN Red List as vulnerable, is currently being studied by a graduate student at Louisiana State University in Shreveport. The Louisiana slimy salamander is listed by the Louisiana Natural Heritage Program as an S1S2 species, which means it is critically imperiled in Louisiana because of extreme rarity or because of some factors making it especially vulnerable. The western worm snake is also listed as an S1 species, meaning it is critically imperiled in Louisiana.[24]

G2. BASELINE PROJECTIONS

G2.1 Land Use Without Project

Before the Fund purchased the Go Zero Tract, it was on the market for sale for more than a year. If the Fund had not undertaken the Red River Restoration Initiative, it is possible that the land may have remained in agriculture, or it may have developed for commercial or residential purposes. At the time of purchase, USFWS did not have the appropriations necessary to buy and restore the land to its natural state; rather the purchase, restoration and long-term protection of this land hinged on the Fund's ability to leverage multiple funding sources including limited federal appropriations and private resources from individual and corporate donors.

G2.2 Future Carbon Stocks Without Project

Carbon stock changes without the Red River Restoration Initiative would be of limited size and significance. If the land was used for agriculture, the carbon capture associated with the agricultural plants would not be sustained over the long term because the agricultural products are harvested every year. The soil carbon stocks would also remain relatively constant as the land was farmed into the future. There is the potential for some small loss in soil carbon stocks as the land is managed over time. Lastly, the carbon emissions associated with agricultural management and use of fertilizers would most likely continue. If the land was developed for commercial or residential use, carbon output would increase due to the carbon emissions associated with development (i.e. machine and vehicle emissions).

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[24] Rare, Threatened and Endangered Species and Natural Communities Tracked by the Louisiana Natural Heritage Program, Natchitoches Parish, April 2008, *available at:* http://www.wlf.louisiana.gov/pdfs/experience/naturalheritage/natchitoches.pdf

G2.3 Local Communities Without Project

Prior to being purchased by the Fund, the Go Zero Tract was farmed by an individual who is one of the largest private landowners in Louisiana. Without the Go Zero project, the land would most likely remain in private ownership, and thus inaccessible to local communities, with continued use for agriculture or possible development.

G2.4 Biodiversity Without Project

Without the project, the land would remain in agricultural production, and/or, as noted above, potentially undergo commercial/residential development, either of which would have an adverse impact on biodiversity. Habitat fragmentation negatively impacts species migration, breeding, and overall survival rates; larger, more connected areas of natural habitat are beneficial to the survival of many species. In addition, with continued farming, heavy equipment usage and fertilizer input would continue to produce negative impacts on surrounding habitat and water quality. Equipment and machinery usage associated with development would also have a negative impact.

G2.5 Water and Soil Resources Without Project

In the absence of the project, the soil might continue to be farmed, leading to further concerns of potential soil erosion. In addition, soil, nutrient, and chemical inputs associated with agriculture would continue feeding into the surrounding streams and rivers, adversely affecting the Red River, the Atchafalaya River system and the Gulf of Mexico. If the Tract was developed for residential or commercial use, the soil would be disturbed and inputs associated with vehicles and heavy machinery would affect water quality.

G3. PROJECT DESIGN AND GOALS

G3.1 Project Scope and Summary of Goals

The scope of the Red River Restoration Initiative includes purchasing approximately 1,182 acres of agricultural land (in two phases) and restoring this land to native habitat by planting it with tree species indigenous to the area. After the trees are planted, the land will then be conveyed to the USFWS for incorporation into Red River NWR.

The three primary goals of the project are to:

- Decrease the effects of climate change via carbon sequestration
- Restore Louisiana's bottomland hardwood forest and wetland ecosystems
- Create long-term community benefits in the form of recreational lands under the management of USFWS – hunting, fishing, wildlife photography, wildlife observation, environmental education and environmental interpretation

G3.2 Description of Project Activities

The main project activities associated with the Red River Restoration Initiative include: contributing to ongoing research relating to forest carbon uptake in the region (via the "Monitoring Umbrella"), measuring the current carbon stocks at the project site, measuring carbon stocks in reference forests, site preparation and planting, project monitoring and verification. These activities will be undertaken by the Fund in conjunction with its partners, including USFWS and Environmental Synergy Inc. ("ESI"). As noted previously, the Fund has partnered with ESI to provide planting and monitoring services for this project. A contract is in place between the Fund and ESI outlining ESI's project responsibilities (see Exhibit A).

- ***Monitoring Umbrella***

  The Red River Restoration Initiative is part of a larger population of similar reforestation projects within a two-year age cohort in the Lower Mississippi Valley ("LMV"). Research undertaken by ESI and their partner Winrock International ("Winrock") has shown that parameters like flood mark height, soil series or bulk density insignificantly impact carbon sequestration and that therefore, multiple planting sites in the LMV, including the Go Zero Tract, can be treated as one population in the statistical analysis of plot measurements. The Go Zero Tract will become part of this "umbrella population" of monitored tracts (referred to as the "Monitoring Umbrella").

- ***Evaluate Current Carbon Stocks***

  In accordance with the Fund's contract with ESI, ESI will establish random plots in the Go Zero Tract and mark them with GPS coordinates and physical markers. ESI then will measure base year characteristics of the area, including initial carbon stocks in the soil and estimates of the biomass carbon of any significant plant material existing on the site prior to planting.

  Samples will then be analyzed and the initial amount of carbon contained on the site calculated, together with samples from other planting sites within the cohort. This will provide an estimate of the baseline conditions against which the future carbon stock change can be measured.

- ***Measure Carbon Stocks in Reference Forests***

  In 2001, under a contract with ESI, Winrock undertook a sampling of biomass and soil plots from varying aged stands in the Lower Mississippi region, from which a projected model for carbon stock change over time was developed as part of the monitoring plan design for ESI's projects in the region. In 2007, ESI led a more extensive research effort to build upon this and other earlier predictive models. The results of this work and the role of the model in the project's monitoring plan will be discussed in Sections CL1 and CL3.

- ***Site Preparation and Planting***

  The first phase—approximately 922 acres—of the Go Zero Tract will be planted in early 2009. ESI has been collaborating with Red River NWR staff to assess site preparation needs and determine the native species composition.

  Nineteen tree species (including seven varieties of Oak) are planned for planting of this site, a mix largely determined by the refuge to meet their habitat objectives. Planting will be undertaken by machine, with an application of Oust during planting to discourage competition in the first year of seedling growth.

  No advance site preparation will be undertaken since machine planting will also loosen soil compaction, important for moisture retention. Oust, formulated for an application rate of one ounce per acre will be applied during planting (with approximately 1/3 ounce actually applied per acre since it is sprayed only on planting strips).

  The USFWS recommended planting rate for the site is 302 seedlings per acre and it will be maintained uniformly across the planting site. Efforts will be made to sufficiently intersperse each of the species across the site as to avoid large areas of single-species plantings.

- ***Project Monitoring***

  ESI's scientific guidance indicates that survivorship is best evaluated at age 3-4 years. In collaboration with Red River NWR staff, ESI will undertake a survival analysis on the Go Zero Tract in this timeframe and report the results to the Fund with recommendations for any replanting.

  ESI will also undertake on-site measurement of tree biomass and soil carbon in the eleventh year following planting (after ten growing seasons). Prior to such measurement, the estimated carbon sequestration on the Go Zero Tract will be based on the carbon accrual graph and procedures detailed in Sections CL1 and CL3 below, together with any new research by Winrock, ESI, or other entities that may be considered to augment or supplant prior research.

- On site measurement of the Go Zero Tract following the tenth growing season will include live trees, dead woody material, repeat soil sampling with data analysis and a report to the Fund. Biomass equations will be used (and developed where necessary) for converting diameter and tree height into total tree biomass data.

- ***Verification***

  This project will be verified by a third party and the offsets retired.

G3.3 Project Location

Maps of project site locations are provided in G1.

G3.4 Project Timeframe

The Fund purchased Phase One of the Go Zero Tract in October 2008 and the planting process will take place in early 2009. The Fund has contracted to purchase Phase Two in October 2009, and planting will commence on this phase in late 2009 or early 2010. The project activities will be most intensive during the first few years of the initiative when planting and the majority of monitoring activities will be taking place. Under the MOU, USFWS will provide long term management of the land. The accounting period for the carbon offsets generated on the Go Zero Tract is 100 years.

G3.5 Risks to Climate, Community and Biodiversity Benefits

For each Go Zero project, the Fund works with the nation's leading public natural resource agencies and non-governmental organizations to ensure that trees are planted in protected areas that have long-term management plans to ensure accuracy and certainty of carbon sequestration. Project areas with high risk of loss, such as from fire or drought, often do not qualify.

Careful risk assessments were made before choosing to restore the Go Zero Tract in Natchitoches Parish; this land was selected for restoration for several reasons. The Tract is located in a very wet area, which reduces risk of drought and also minimizes risk of fire. The risk of damage from hurricanes is also fairly low because the Tract is located in the northern part of the state; wind and rain damage from past hurricanes in Louisiana, including Hurricane Katrina, was mainly confined to coastal areas.

While there is always a small but potential risk due to human activities such as unlawful hunting or reckless destruction, the low population density in the area directly surrounding the Tract, as well as law enforcement vigilance by the refuge makes human interference with the project unlikely.

G3.6 Stakeholder Identification

There are numerous stakeholders invested in this project. The Fund purchased the land and will own the land while it is being restored, and manage the restoration. The purchase and restoration of the land was also made possible, in part, by the Fund's donors, and we have identified these donors as stakeholders in this process as well.

After the land is restored, the Go Zero Tract will be conveyed to the USFWS. The Service will manage the Tract as part of the National Wildlife Refuge System and is the entity responsible for the long-term management of the forestland.

The last group of stakeholders includes the local citizens of Natchitoches and the surrounding parishes, including local parish governments and local environmental groups. Groups such as the Red River Refuge Alliance (an all-volunteer "friend's group" dedicated to assisting the Red River NWR with its mission) are included as stakeholders as well.

G3.7 Transparency and Project Information Availability

The National Wildlife Refuge System Improvement Act of 1997 requires each refuge to develop a CCP for achieving refuge objectives consistent with sound principles of fish and wildlife management, conservation, legal mandates, and USFWS policies. The National Environmental Policy Act ("NEPA") requires each plan to examine a full range of alternative approaches to refuge management and to involve the public in selecting the approach best suited to each refuge's purposes. Before the CCP for Red River NWR could be finalized, USFWS held a public scoping meeting and solicited public reaction to proposed alternatives for refuge management. A thirty day public review and comment period of the draft CCP was provided and public comment encouraged.

This Project Design Document ("PDD") will be made publicly available on the Climate, Community and Biodiversity Alliance ("CCBA") website and open to comments from the public. The PDD will also be made available in hard copy through the Red River Refuge Alliance, which is based in Shreveport, ensuring that project documentation is available near the project site and available to local residents who do not have access to the Internet. In addition, all key documentation and information regarding the Red River Restoration Initiative will be available on the Fund's website. Furthermore, the model for projected carbon stock changes over time that will be utilized for the project will soon be published in the journal *Wetlands*.

G4. MANAGEMENT CAPACITY

G4.1 Management Team Experience

The management responsibilities of the Red River Restoration Initiative are split between the Fund and USFWS. As described in G3.2, the Fund has also contracted with ESI to provide planting and monitoring services. Descriptions of each organization's experience are described below.

The National Wildlife Refuge system, managed by the USFWS, is the world's premier system of public lands and waters, set aside to conserve America's fish, wildlife and plants. The Refuge System has grown to more than 96 million acres, including 548 refuges and 37 wetland districts. Refuge management is the core business of USFWS.

The Fund is one of the nation's foremost environmental nonprofits dedicated to protecting America's most important landscapes and waterways for future generations. Since its founding in 1985, the Fund has helped its partners safeguard wildlife habitat, working farms and forests, community greenspace, and historic sites totaling more than 6 million acres nationwide. The Fund's carbon sequestration programs, including, but not limited to Go Zero, have helped to restore 20,000 acres with 6 million trees which will capture an estimated 7.2 million tons of carbon dioxide equivalent from the atmosphere over their lifetime.

The Fund has partnered with ESI to provide planting and monitoring services for this project. ESI is an Atlanta-based company providing afforestation and carbon quantification services to clients as a means to offset carbon dioxide emissions and promote sustainable forestry. ESI has planted more indigenous trees in the United States, on more acres of land, for the purpose of carbon sequestration than any other organization in the nation. ESI professionals have tremendous experience working with federal, state, non-profit and other business partners to provide programs combining state-of-the-art carbon sequestration science and restoration of ecologically damaged ecosystems.

G4.2 Management Capacity and Project Scale

The scale of the Red River Restoration Initiative is well within the management capacity of the Fund, USFWS, and ESI. As stated above, all of these organizations have a great deal of previous experience managing and monitoring forest carbon projects. For example, in addition to its Go Zero program, the Fund also owns 40,000 acres of redwoods and Douglas fir forests in Mendocino County, CA. The Fund manages these forests as sustainable working forests, benefiting both the environment and the local economy. All 40,000 acres of forest in CA have also been registered with the California Climate Action Registry ("CCAR") and produce verified carbon emission reductions.

G4.3 Technical Skills of Project Team

The Fund will be responsible for project coordination and implementation of the reforestation project. The Go Zero program has completed multiple carbon projects of this kind in the past, and has the skill set needed to implement the Red River Restoration Initiative.

The employees of ESI possess the skills and knowledge needed for packaging and storing seedlings, planting seedlings, soil sampling, carbon monitoring, tree survival analysis, and monitoring of soil and tree biomass carbon during the project lifetime.

The USFWS team possesses the appropriate skill set needed for biodiversity monitoring and long term habitat monitoring.

Local groups, including the Red River Alliance, will be able to monitor community impacts.

G4.4 Financial Health of Implementing Organizations

USFWS is a financially stable agency within the United States government, funded through federal appropriations, and does not pose a financial risk to the longevity of the Red River Restoration Initiative.

The Fund leverages conservation dollars from our public and private partners, saving taxpayers more than $1 billion in land purchase costs to date on lands valued in excess of $3.6 billion. The Fund puts an average of 97 percent of its budget directly into conservation programs and just 1 percent into fundraising. The Fund is recognized annually as one of the nation's top environmental organizations by two charity watchdog organizations, American Institute of Philanthropy and Charity Navigator.

The Fund's work is made possible with generous support from individuals, foundations, corporations and government agencies. Its commitment to accountability and donor transparency remains a cornerstone of its operations. Copies of the Fund's 2007 Consolidated Audit and 2007 990 Tax Return can be found at:
http://www.conservationfund.org/who_we_are/financials

G5. LAND TENURE

G5.1 Private Property and Land Rights

The first phase of the Red River Restoration Initiative, 922 acres, was acquired by the Fund from a willing seller, a private landowner, in October 2008. The Fund will maintain ownership of the land while it is being planted and restored. Federal appropriations toward the land acquisition are being secured, which together with Go Zero's donor funding contributions will enable conveyance of the land to USFWS for long term management and stewardship.

G5.2 Voluntary Nature of the Project

As noted above in G5.1, the private landowner sold his land willingly to the Fund.

G5.3 Potential In-Migration

Not relevant to project.

G6. LEGAL STATUS

G6.1 Compliance with Laws

Federal Law

The Red River Restoration Initiative is supported by a solid framework of federal laws. The National Wildlife Refuge System Improvement Act of 1997 established a clear legislative mission of wildlife conservation for the refuge system and actions were initiated that same year to comply with the directive of this new legislation. This Act required CCPs to be completed for all refuges, with full public involvement, to help guide the management of each refuge.

Red River NWR was established in October 2000 under Public Law 106-300. This legislation authorized the establishment of Red River NWR to provide for the restoration and conservation of fish and wildlife habitats in the Red River Valley ecosystem in northwest Louisiana. The CCP for Red River NWR was completed in July 2008.

On March 30, 2007, the Fund and USFWS signed a Memorandum of Understanding ("MOU") (see Exhibit B), pursuant to the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661-667e and the Fish and Wildlife Act of 1956, 16 U.S.C. §§ 742a – 742j. The goal of the MOU is to create private/public partnerships as a way to generate support for the restoration and conservation of native habitats. Under the MOU, the Fund agrees to—among other things—seek donations

from individuals, corporations and other organizations to support Go Zero habitat restoration projects on National Wildlife Refuges across the country. USFWS agrees to—among other things—be responsible for oversight and approval of habitat restoration activities on the ground and provide long-term management of these lands under natural conditions, and according to best wildlife and habitat management practices.

Labor Law

Our contracts indicate that our partners, including ESI, have complied with national, state and local labor laws.

Real Estate Law

The Fund purchased the land from a private individual, according to all applicable federal, state and local laws governing real estate transactions.

G6.2 Approval from Appropriate Authorities

As stated above, the Fund has a signed agreement with USFWS, recognizing the Fund's ability to plant and restore land with the intention of conveying it to the Service for addition to the refuge system.

G7. Adaptive Management for Sustainability

N/A

G8. KNOWLEDGE DISSEMINATION

G8.1 Documentation of Project Lessons Learned

The lessons learned from this project will be documented on the Fund's web site, which will contain links to key documentation used in this project, including this PDD. This document will also be publicly available on the CCBA web page and serve as a useful tool to future project developers who are looking to do reforestation projects in the United States or other developed countries.

G8.2 Dissemination of Information

Project documents and relevant information are readily available from the following links. In addition, the model for projected carbon stock changes over time that will be utilized for the project will soon be published in the journal *Wetlands*.

The Conservation Fund web site: www.conservationfund.org

Climate, Community & Biodiversity Alliance web site: www.climate-standards.org

USFWS web site: http://www.fws.gov/ or http://www.fws.gov/northlouisiana/RedRiver/

CLIMATE SECTION

CL1. NET POSITIVE CLIMATE IMPACTS

CL1.1 Estimation of Net Changes in Carbon Stocks

The estimation of net changes in carbon stocks for the Red River Restoration Initiative was drawn from ESI's experience over ten years in measuring carbon accumulation in the Lower Mississippi River Valley. ESI has been contracted by the Fund to plant the project area, to measure the baseline conditions, and to monitor the project's ongoing carbon gains. In 2007, ESI led an extensive research effort to build upon earlier predictive models of carbon sequestration in this region. The 2007 initiative involved a consortium of leaders in forest science and carbon project development, drawing on expertise from representatives of ESI, Winrock, The Nature Conservancy, the Yale School of Forestry and Environmental Studies, the USDA Forest Service Center for Bottomland Hardwoods Research in Stoneville, Mississippi and the U.S. Geological Survey. The team amassed the most comprehensive dataset of bottomland hardwood stands yet assembled for the region, drawing on 540 biomass plot measurements, and produced the most reliable predictive model to date.

The new model, using the new empirical biomass data together with forest inventory data represented in USDOE 1605(b) tabular estimates for minor pools (e.g., dead wood, understory and soil carbon), predicts 259 metric tons of CO_2 equivalent per acre (i.e., 286 short tons per acre) at year 50, and 328 metric tons of CO2 equivalent per acre (i.e., 361 short tons per acre) at year 100. The annualized average for the first 50 years is 5.2 metric tons of CO_2 equivalent per acre per year (i.e., 5.7 short tons of CO_2 equivalent per acre per year). The results have been vetted through a rigorous internal peer review process and have been accepted for upcoming publication in the journal *Wetlands*. Table 2 illustrates the result of the 2007 research as outlined in Shoch et al.'s forthcoming publication in *Wetlands*.

Table 2: Tabular data of projected carbon curve over 100 year period of LMV bottomland hardwood forest. (courtesy David Shoch, TerraCarbon LLC)

Measured		USDOE tables			(metric)	(short tons)
Stand age	Aboveground live tree tC/ha	Soil	Dead Wood and Understory	TOTAL	t CO2-e/ac	t CO_2-e/ac
0	0.8	0	0.0	0.8	1	1.4
5	4.8	0.1	1.9	6.8	10	11.2
10	14.4	0.5	5.0	19.9	30	32.6
15	29.8	1.1	7.6	38.5	57	63.0
20	49.3	1.9	9.4	60.6	90	99.0
25	70.4	2.9	10.9	84.2	125	137.6
30	90.9	4	12.1	107.0	159	175.0
35	109.6	5.1	13.3	128.0	190	209.3
40	125.7	6.2	14.6	146.5	217	239.5
45	139.1	7.3	15.5	161.9	240	264.7
50	149.9	8.3	16.6	174.8	259	285.8
55	158.5	9.2	17.6	185.3	275	302.9
60	165.2	10.1	18.4	193.7	287	316.7
65	170.3	10.7	19.4	200.4	297	327.8
70	174.3	11.3	20.2	205.8	305	336.6
75	177.4	11.8	21.0	210.2	312	343.7
80	179.7	12.2	21.6	213.5	317	349.1
85	181.4	12.4	22.4	216.2	321	353.5
90	182.7	12.7	23.2	218.6	324	357.5
95	183.7	13	23.2	219.9	326	359.6
100	184.5	13.3	23.2	221.0	328	361.3

Pre-project carbon stocks

As noted in Section G1.3, the assumption for pre-project carbon stocks (i.e., on the agricultural lands prior to reforestation) is that the woody biomass carbon stocks are zero. The only baseline carbon stock is the soil carbon. The project monitoring program includes baseline soil measurements from which future gains can be observed.

CL1.2 Non-CO2 greenhouse gases

Non-CO_2 gases are not expected to account for a significant percentage of the Red River Restoration Initiative overall greenhouse gas ("GHG") impact and are not considered significant because of multiple factors. First, site preparation methods will not cause significant long-term net decreases of soil carbon stocks or increases of non-CO_2 emissions from the soil. For example, no chemical fertilizers or burning treatments will be used on site during site preparation or planting.

In addition, the soil disturbance associated with planting should be minimal. When soil is disturbed, some of the carbon stored in the soil can be lost to the atmosphere, though losses tend to be quickly regained over the process of forest growth, and in some cases, especially with wetlands and water-bogged soil, soil disturbance can cause methane loss. The Go Zero Tract will be planted by a machine in which a mechanized tool called a "foot" opens a planting slit 12-16" deep, which simultaneously loosens the soil for better moisture retention and

creates a hole for the seedling. A special wheel then tightens up the surface soil around the seedling, reducing soil disturbance. Our expectation is that there should be no long-term methane emissions associated with machine planting and any short term emissions should be quickly recovered by incorporation of new soil organic matter from forest growth.

Figure 7: Illustration of machine planting

CL1.3 Net Climate Impact

As noted above, the new climate model predicts 259 metric tons of CO_2 equivalent per acre (i.e., 286 short tons per acre) at year 50, and 328 metric tons of CO_2 equivalent per acre (i.e., 361 short tons per acre) at year 100. The annualized average for the first 50 years is 5.2 metric tons of CO_2 equivalent per acre per year (i.e., 5.7 short tons of CO_2 equivalent per acre per year).

Other Considerations – Permanence and Additionality

When assessing the net climate impact of a project, other factors such as the project's permanence and additionality are also often taken into account. As previously stated in G3.5, the Fund works with the nation's leading public natural resource agencies, such as USFWS, to ensure that trees are planted in protected areas that have long-term management plans to ensure accuracy and certainty of carbon sequestration. Under the MOU between USFWS and the Fund, the Service has agreed to provide long-term protection and management of Go Zero projects under natural conditions and according to best wildlife and habitat management practices. The MOU is strengthened by the Service's commitment to incorporate the Go Zero Tract into Red River NWR's CCP (see Exhibit C, Letter from USFWS Regional Director Sam Hamilton).

Careful risk assessments were made before choosing to restore the Go Zero Tract in Natchitoches Parish, and the possibility of any unanticipated risk is mitigated by a buffer pool of offsets that will not be issued or sold. This buffer will be large enough to account for any impacts that might reduce the total carbon offsets generated by this project.

Also, in accordance with the Fund's planting principles, all of the Fund's forest-based carbon sequestration projects result in additional carbon dioxide capture compared to that which would otherwise have occurred. As stated above, the Go Zero Tract was once a healthy, forested ecosystem. It was deforested prior to 1990 and converted to agriculture. Without the Go Zero project, the land would have likely remained in agriculture with a net climate impact of zero and/or converted to development with a negative climate impact.

CL2. OFFSITE CLIMATE IMPACTS

CL2.1 Leakage

It is unlikely that leakage due to this project will be a major concern. According to a white paper published by the Offset Quality Initiative, reforestation and afforestation projects are less likely to be affected by potential leakage impacts than other carbon projects.[25] In this case, the primary concern is that as a result of the Go Zero tract being taken out of agriculture and restored to trees, farmers may clear healthy forests to create more viable agriculture lands. First, this is unlikely given that so much of the native forestland in the area has already been cut and converted in preceding decades. In fact, only about 30% of the original bottomland forests still remain in this ecoregion.[26]

Furthermore, the history of the federally subsidized Conservation Reserve Program[27, 28] ("CRP") makes leakage unlikely here. Administered by the United States Department of Agriculture's Natural Resources Conservation Service, CRP provides financing to farmers who are willing to take their lands out of agricultural production and restore them to a more natural state. Since its inception, the CRP program in Natchitoches has been fully subscribed. The local Natchitoches CRP program officer, Dale Ford, has stated in recent conversations that in his experience, there have been no leakage effects associated with the CRP; specifically, no forested land has been cleared for farming despite increasing enrollment of lands in the CRP and a reduced agricultural land base. In this way, the Conservation Reserve Program is analogous to the Red River Restoration Initiative, and thus we should expect very little leakage from reforestation projects in this region.

CL2.2 Mitigation of Negative Offsite Impacts

Because no offsite impacts attributable to project leakage are anticipated, no direct actions will be necessary to mitigate their effect.

CL2.3 Net Effect of Climate Impacts

The total net effect of climate impacts of this project will be positive. As noted above, there are no anticipated negative climate impacts.

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[25] Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets into North American Cap-and-Trade Policy, p. 19. July 2008. The Offset Quality Initiative. *Available at*: http://www.offsetqualityinitiative.org/index.html

[26] BATTAGLIA, L. L., P. R. MINCHIN, AND D. W. PRITCHETT. 2002. Sixteen years of old-field succession and re-establishment of a bottomland hardwood forest in the Lower Mississippi alluvial valley. Wetlands 22: 1–17.

[27] United States Department of Agriculture, "Conservation Reserve Program," *available at* :
http://www.nrcs.usda.gov/PROGRAMS/crp/
The USDA Farm Service Agency, *available at*:
http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp-sp

[28] United States Department of Agriculture, "Wetland Reserve Program," Available:
http://www.nrcs.usda.gov/PROGRAMS/wrp/

CL3. CLIMATE IMPACT MONITORING

CL3.1 Monitoring Plan

Background

The monitoring plan that governs the Red River Restoration Initiative was developed in 2001 by Winrock for ESI with the objective of establishing a scientific basis for measuring carbon stock changes over time on reforestation sites with similar characteristics in the Lower Mississippi Alluvial Valley ("LMAV"). Although the Go Zero Tract is not technically within the LMAV, the species composition at this site as well as the climate and soil properties are similar to those found in the LMAV and is considered part of the same ecoregion. Therefore, this project will be monitored as part of a larger population of other similar reforestation projects undertaken by clients of ESI in the same region and the same stratum. The monitoring plan accounts for spatial variability in carbon stocks in vegetation and soil of forests, which helps to determine the number of measurement plots across the stratum.

As discussed in Section G3.2, the Go Zero Tract will become part of the "umbrella population" of monitored tracts, referred to as the "Monitoring Umbrella." The monitoring umbrella provides a coordinated system for tracking carbon sequestration on similar projects distributed across the Lower Mississippi planting region. The benefit is that the Red River site belongs to a larger monitoring population that allows for distributing the substantial costs of monitoring among component tracts while producing robust results that will apply across the entire population of tracts.

Precision Levels

The number of monitoring plots, together with the spatial variability, determines the precision of the carbon measurements in biomass and soils. Based on an initial assessment of variability, the monitoring plan has been designed with a sufficient sample size to produce estimates of total carbon per unit area within +/- 10% of the mean with 90% confidence.

Monitoring Protocol

ESI's monitoring protocol for the Go Zero Tract will consist of three components: (I) base-year analysis (i.e., to determine soil carbon stocks and establish permanent monitoring plots); (II) tree survival analysis at year three and; (III) measurement of carbon stocks after the tenth growing season.

1. Base-year analysis

Within twelve months of planting, ESI will establish random plots on the Go Zero Tract that will be marked with GPS coordinates and physical markers to remain as permanent sample plots.

The following base year characteristics will be measured:

a. Initial carbon stocks in the soil.

b. Estimates of the biomass carbon of any significant plant material existing on the site prior to planting.

These samples will be analyzed and the initial amount of carbon contained on the site calculated, together with samples from other planting sites within the cohort. This will provide an estimate of the baseline conditions against which future amount of sequestered carbon will be compared.

Soil Sampling

Soils will be sampled with a standard soil corer. Four samples to 50 centimeters depth are collected in each plot, one randomly located in each quarter of the circular plot. The soil from each core will be bulked and all samples well-mixed together, with a sub-sample collected and placed in a labeled paper bag for carbon analysis. One additional soil core is taken from each sampling point and placed in one sample bag to be used for bulk density measurement.

Future sampling points will be located as close as possible to the original points to be in a better position to sample the same soil and to detect change. Soil bulk density measurements will be oven-dried and corrected to account for any rock fragments that may be present. Calculating carbon contents on an equal mass basis is particularly important for detecting changes over time.

2. Tree survival analysis

ESI foresters and other scientific guidance indicate that survivorship is best evaluated at age 3-4 years.[29] In collaboration with Red River NWR staff, ESI will undertake a survival analysis on the Go Zero Tract in this timeframe and subsequently report those results to the Fund with recommendations for any suggested replanting.

3. Monitoring of soil and tree biomass carbon during the project

ESI will undertake on-site measurements in the eleventh year following planting. Prior to such measurement, the estimated carbon sequestration in biomass will be based on the carbon accrual graph below, together with any new research by ESI, Winrock , or other entities that may be considered to augment or supplant prior research. Figure 8 below reflects the results of the ESI-led research effort in 2007 to build upon earlier predictive models of carbon sequestered over time in the bottomland hardwood forests of the Lower Mississippi Valley.

[29] Allen, J. A. 1990. Establishment of bottomland oak plantations on the Yazoo National Wildlife Refuge Complex. Southern Journal of Applied Forestry. 14(4): 206-210.

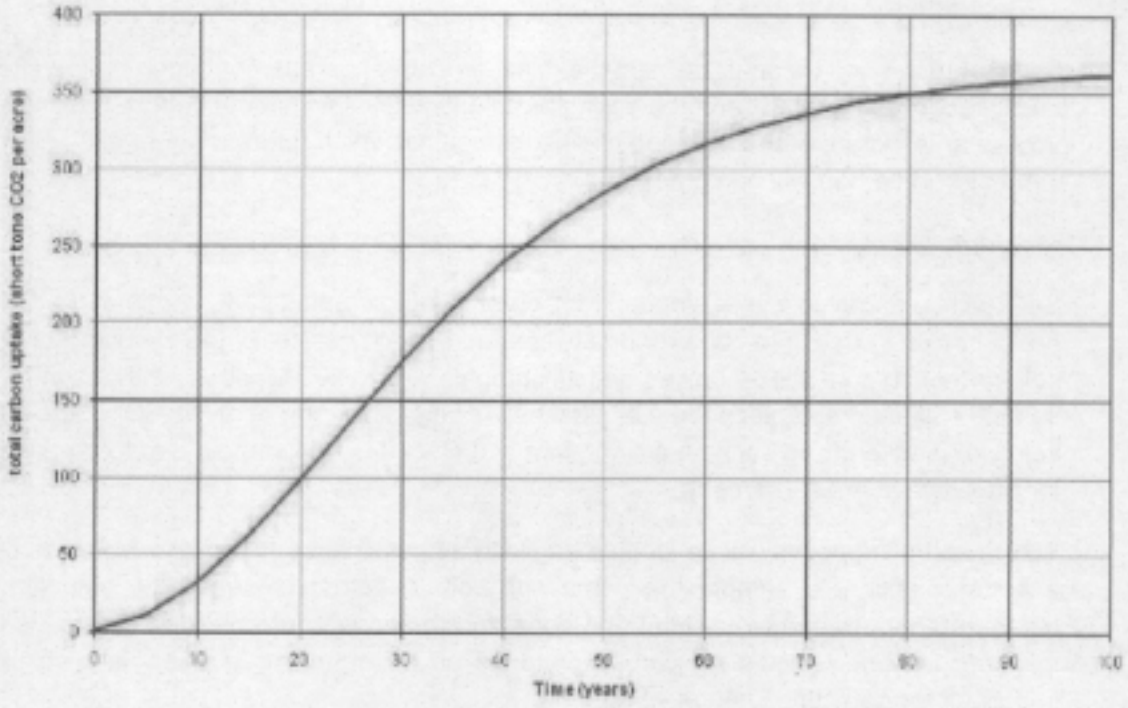

Figure 8: Predictive Model for carbon sequestration in bottomland hardwoods in the Lower Mississippi Valley Region

On-site measurement of the Go Zero Tract following the tenth growing season will include live trees and dead woody material. The measurement will include live trees, dead woody material, and repeat soil sampling, with data analysis and a report to the Fund. Biomass equations will be used for converting diameter and tree height data into total tree biomass data.

CL4. ADAPTING TO CLIMATE CHANGE AND CLIMATE VARIABILITY

CL4.1 Regional Climate Change Impacts

Regional climate change and climate variability will likely impact reforestation areas including the Red River Restoration Initiative. While changes in temperature, precipitation and CO_2 levels have been shown to impact growth and competition of trees, severe storms (i.e., hurricanes) and excessive inundation could possibly impact the Go Zero Tract survivorship.[30] Louisiana's climate may significantly change over the next century. By the close of the 21st century, Louisiana could see a 3° Fahrenheit increase in spring and summer temperatures (i.e.,

[30] Chapman, E.L. Chambers, J.Q., Ribbeck, K.F., Baker, D.B., Tobler, M.A., Zeng, H., White, D.A. Hurricane Katrina impacts on forest trees of Louisiana's Pearl River basin. Forest Ecology and Management. 256: 2008.

slightly less in winter, slightly more in fall). Little change is predicted for seasonal precipitation totals in winter and spring, with an increase of around 10% in summer and fall. The frequency of extreme hot days in summer is expected to increase along with the general warming trend. While the effects of El Niño events are varied depending on geography, they are associated with increased precipitation and severe storms in some regions, such as the Southeast U.S.[31] Figure 9 and Figure 10[32] below show some of the predicted changes in temperature and precipitation in the future.

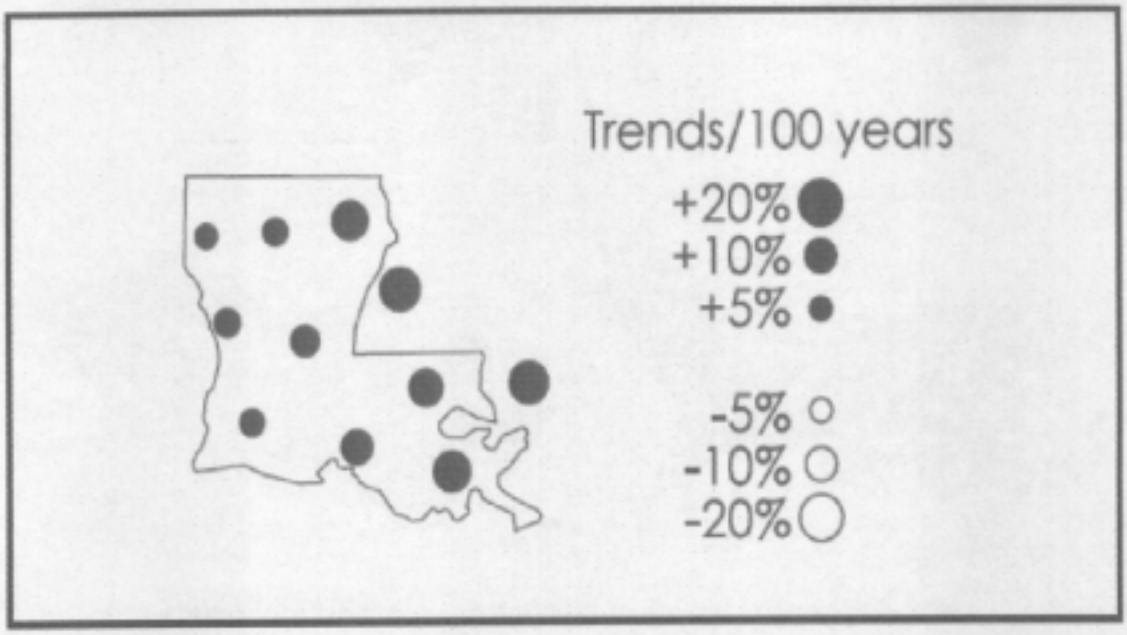

Figure 9: 20th Century Precipitation Trends in Louisiana, Madison Parish is located in the upper right corner with a +10% increase. From "Climate Change and Louisiana" (EPA, 1997)

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[31] Field, C.B., L.D. Mortsch,, M. Brklacich, D.L. Forbes, P. Kovacs, J.A. Patz, S.W. Running and M.J. Scott, 2007: North America. *ClimateChange 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 617-652.

[32] Sun, Ge, Steven G. McNulty, Jennifer A. Moore Myers, and Erika C. Cohen, 2008. Impacts of Multiple Stresses on Water Demand and Supply Across the Southeastern United States. Journal of the American Water Resources Association (JAWRA) 44(6):1441-1457.

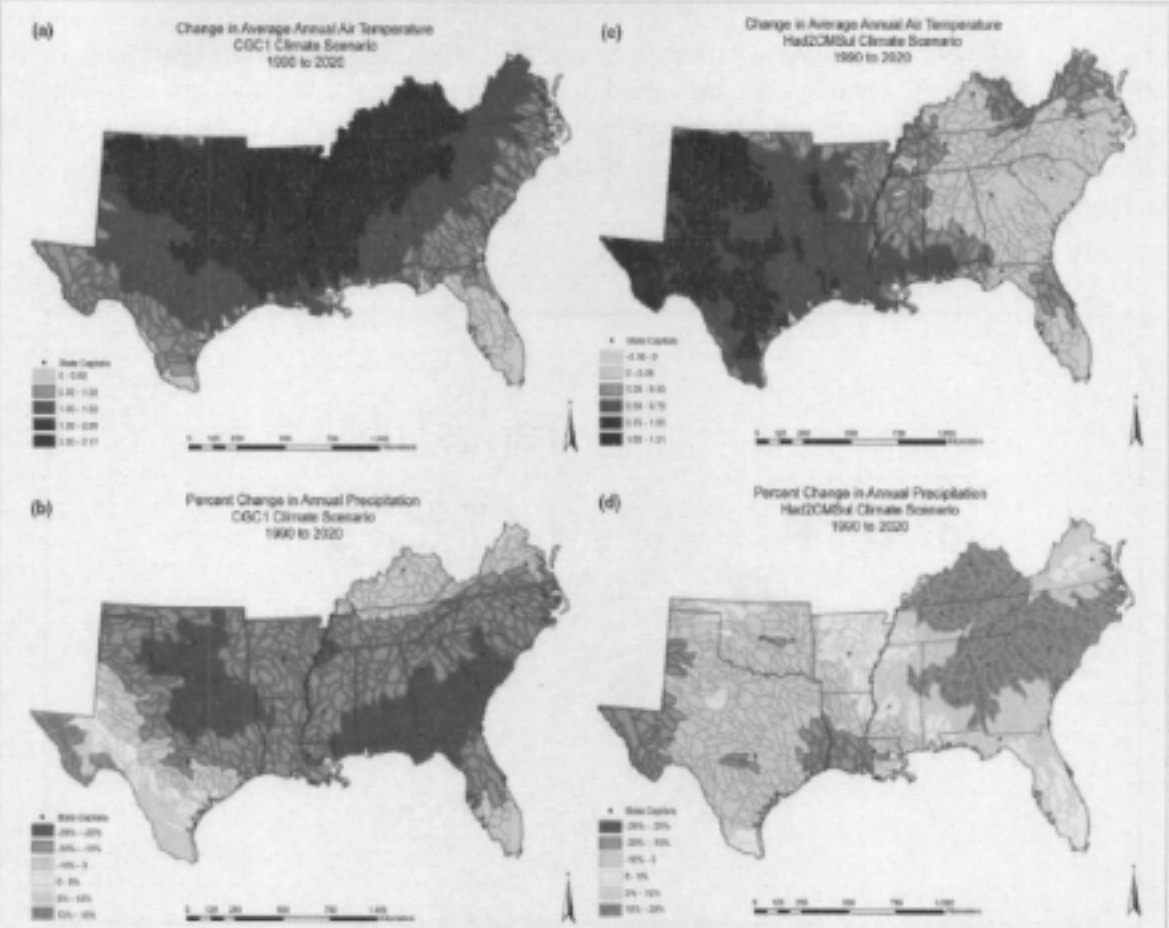

Figure 10: Predicted Changes in Air Temperature and Precipitation Across the Southern U.S. by the CGC1 Model (a and b) and the HadCM@Sul (c and d) Model in 2020

There is currently debate about whether or not there is an increasing frequency of hurricanes or if hurricanes are increasing in intensity.[33, 34, 35, 36] Both the U.S. Environmental Protection Agency and the Intergovernmental Panel on Climate Change maintain that it is unclear how severe storms such as hurricanes will change and future trends in hurricane frequency and

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[33] Emanuel K (2005) Increasing destructiveness of tropical cyclones over the past 30 years. *Nature*, 436, 686-688.

[34] Klotzbach PJ (2006) Trends in global tropical cyclone activity over the past twenty years (1986–2005). *Geophys. Res. Lett*, 33, L10805.

[35] Pielke Jr RA (2005) Are there trends in hurricane destruction. *Nature*, 438, 686.

[36] Pielke Jr RA, Landsea C, Mayfield M, Laver J, Pasch R (2005) Hurricanes and Global Warming. *Bulletin of the American Meteorological Society*, 86, 1571-1575.

intensity remain uncertain.[37] It does seem that increasing sea surface temperatures due to global warming will result in increasing power of the strongest hurricanes[38] and this may impact the probability of forest disturbance at the Go Zero Tract.

CL4.2 Measures Taken to Anticipate Climate Change Impacts

The project location could potentially suffer mortality if it was in the path of a hurricane. Strong winds and flooding are known to cause some mortality in forests in this region. Use of native species that historically thrived in this environment will help to minimize the effects of such calamities. The Fund is committed to using native species in all of its carbon projects. However, in the case where significant mortality does occur despite the more resilient native species mix due to wind-throw or flooding, the Fund will replant areas that suffer significant mortality within the first ten years.

In addition to the direct mitigation of climate change impact on the Go Zero Tract, the Red River Restoration Initiative will, in fact, help mitigate climate change impacts by reversing a previous deforestation trend and by improving watershed and wetland protection. Healthy ecosystems are more resilient to climate variability and climate change impacts. By restoring forests to this region, this project is reducing the risk of severe flooding, stabilizing river and stream banks to prevent severe erosion, and slowing desiccation of rivers and underground water sources during severe droughts.

CL5. CARBON BENEFITS WITHHELD FROM REGULATORY MARKETS

All of the carbon benefits generated by the Red River Restoration Initiative will be withheld from regulated GHG markets and will be retired upon their sale.

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[37] U.S. Environmental Protection Agency, "Climate Change and Louisiana," *available at*: http://yosemite.epa.gov/OAR/globalwarming.nsf/UniqueKeyLookup/SHSU5BURCA/$File/la_impct.pdf

[38] Elsner, J.B., Kossin, J.P., and Jagger, T.H. 2008. The increasing intensity of the strongest tropical cyclones. *Nature*, 455, p.92-95.

COMMUNITY SECTION

CM1. NET POSITIVE COMMUNITY IMPACTS

CM1.1 Community Benefits

Residents from all across northern Louisiana will benefit from a restored Red River NWR. The Go Zero Tract, which was previously private farmland, will now become part of the nation's refuge system and can be enjoyed by the entire public and especially residents in the surrounding communities. Red River NWR provides numerous recreational opportunities to local residents, including hunting, fishing, wildlife photography and observation, environmental education and interpretation.

Figure 11: Red River Refuge Celebration

Red River NWR also hosts social events which increase the quality of life of local residents, giving them more chances to interact with friends and neighbors. The Red River Refuge Alliance [39] sponsors a free refuge celebration each year during National Wildlife Refuge Week, which includes educational nature walks, children's activities and free food and refreshments. Over 850 local residents attended the celebration this past year, allowing community members to come together and enjoy the outdoors. The celebration included hay rides, falconry exhibits, bird walks and many other entertainments.[40]

In addition to this annual celebration, the Red River Refuge Alliance hosts other events that take place throughout the course of the year. These include an international migratory bird

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[39] The group will officially change its name to Friends of the Red River National Wildlife Refuge in 2009.

[40] The Red River Raft, A Publication of the Red River Refuge Alliance, *available at* http://www.redriverrefugealliance.org/RaftSummer08.pdf

event, an Earth Day event, a spring open house, and other bird watching and photography related events. They also conduct tours and try to increase public access to refuge lands.

Figure 12: Boy Scout Troop

The Red River Refuge Alliance has received a grant from the National Wildlife Refuge System's "Nature of Learning" program.[41] This program is a community-based education program that uses national wildlife refuges as outdoor classrooms and seeks to promote a greater understanding of conservation issues while enhancing academic student achievement. The program generally involves a partnership among local schools, community groups, natural resource professionals and local businesses.

The Alliance also makes presentations to community groups and gives slide show presentations to biology classes in Natchitoches. The local Boy Scout troop did a trail marking project and the local Youth Conservation Corp helped refurbish the temporary visitor center.[42]

An expanded refuge system will also confer significant economic benefits to neighboring communities. Data provided by the latest National Survey of Fishing, Hunting and Wildlife-associated Recreation show that for the year 2001, a total of 1.6 million people participated in fishing, hunting, and wildlife-watching activities in Louisiana. These activities resulted in roughly $1.6 billion in expenditures, with the majority spent on equipment (58 percent) and trip-related (36 percent) expenses. Of these totals, approximately 970,000 enthusiasts participated in fishing and 12.1 million fishing trips were made. The total expenditures for fishing were $703 million, with 57 percent trip-related, 39 percent for equipment, and 5 percent for other expenses. A total of 333,000 enthusiasts participated in hunting and 6.3 million hunting trips were made. Total hunting expenditures were $446 million, with 61 percent spent on equipment, 27 percent trip-related, and 12 percent for other expenses. A total of 935,000 enthusiasts participated in wildlife watching, and 2.4 million trips were made. Total expenditures for wildlife watching were $168 million, with 58 percent spent on equipment, 33 percent trip-related, and 9 percent for other expenses.[43]

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[41] For more information on the FWS Nature of Learning Program, *see* http://www.fws.gov/refuges/education/natureOfLearning/intro.html

[42] Direct Communication, Nancy Manasco, President, Red River Refuge Alliance.

[43] Red River CCP, *available at* http://www.fws.gov/southeast/planning/RedRiverFinalPg.html

The above numbers reflect the advantages an outdoor destination area such as a wildlife refuge can bring to a local economy. By restoring and strengthening Red River NWR, local residents will be able to enjoy an economic advantage that accompanies an area's elevated recreational status.

CM1.2 Stakeholder Participation in Project Planning

All stakeholders with legal claims to the land involved in the Red River Restoration Initiative are active project participants. Once the land is conveyed to USFWS, it will have sole legal claim to the land for the foreseeable future. Pat Stinson, Red River NWR Manager and local area resident, will participate in all management decisions.

There are also opportunities for local community stakeholders to voice their opinions on the restoration of the Go Zero Tract. There is a public comment period for this project, and this project document will be posted on both the CCBA web site and the Fund's web site. In addition, the local community will be notified of the project through available channels, including the Red River Alliance and Red River NWR visitor center, and hard copies of the document will be made available to residents who don't have access to the Internet.

In addition, before the CCP for Red River NWR could be finalized, USFWS held a public scoping meeting and solicited public reaction to proposed alternatives for refuge management. A thirty day public review and comment period of the draft CCP was provided and public comment encouraged. During the public comment period, residents sent in comments and concerns about management plans for Red River NWR, and responses to these concerns were incorporated into the CCP.

CM1.3 Conflict Resolution and Grievance Procedures

Federal, state and local laws are in place to help resolve potential grievances. The USFWS is under federal jurisdiction and obligated to comply with all federal laws. Also, as mentioned above, the public comment period for the CCP allowed residents a chance to voice concerns and grievances. There will also be a public comment period for the Red River Restoration Initiative via CCBA so that the community can express any concerns that they have regarding the Go Zero Tract restoration.

CM2. OFFSITE COMMUNITY IMPACTS

CM2.1 Potential Negative Offsite Community Impacts

There are no potential negative impacts from restoring the Go Zero Tract and adding the land to Red River NWR. The individual farmer who previously owned the land is moving his operations to another piece of farmland already in his possession. Therefore, there should be minimal impacts due to the fact that the land is being taken out of agricultural production. There are no other anticipated community impacts.

CM2.2 Mitigation of Negative Impacts

N/A

CM2.3 Net Social and Economic Impacts

There are no anticipated negative impacts caused by the restoration of the Go Zero Tract. As stated above, the individual who previously farmed the land is moving his farming to another piece of agricultural property already in his possession. Restoring the land to native forest and conveying it to USFWS confers many benefits on the surrounding community, as described in CM1.1. Thus, the net effect on the community is extremely positive.

CM3. COMMUNITY IMPACT MONITORING

CM3.1 Monitoring Plan

The USFWS, including Red River NWR staff, will monitor the community benefits described in CM1.1 including recreation and related activities in the area. The Red River Refuge Alliance generally monitors community reaction to activities occurring at Red River NWR and will be able to give feedback regarding any impacts on the community.

BIODIVERSITY SECTION

B1. NET POSITIVE BIODIVERSITY IMPACTS

B1.1 Net Positive Biodiversity Under the Project Scenario

The Red River Restoration Initiative will result in numerous environmental benefits. In addition to reducing the effects of climate change, the restoration of the Go Zero Tract will restore key parcels within the boundary of Red River NWR and provide additional habitat for native species. Red River NWR is an especially important area to migratory birds and to several threatened or endangered species. Expansion of this ecosystem will have significant positive effects on biodiversity and the wildlife that depend on bottomland hardwood forests (as more fully described in sections G1.6 and G1.7).

The Red River Restoration Initiative will also result in improved water quality, both along Red River and the systems it feeds into, including the Gulf of Mexico. Soil, nutrient, and chemical inputs associated with agriculture will be reduced due to the lack of continued farming on the Tract. The replanted areas will also improve water quality by filtering and flushing nutrients, processing organic wastes, and reducing sediment before they reach open water.

Restoration of the Go Zero Tract will also improve flood control and reduce soil erosion. Bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater.[44] The soil quality will be healthier due to increased diversity of plant life and biomass accumulation associated with forest regeneration.

B1.2 Possible Adverse Effects of Non-Native Species

Only native species will be used for the Red River Restoration Initiative.

B1.3 Threatened Species

Threatened species on the IUCN Red List, as well as those listed by USFWS and tracked by the Louisiana Natural Heritage Program, are listed in Section G1.7 of this project document.

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[44] Environmental Protection Agency, Wetland Types, Bottomland Hardwoods, *available at* http://www.epa.gov/owow/wetlands/types/bottomland.html

B1.4 Species Used by the Project

In accordance with the Fund's planting principles, the Go Zero Tract will be planted with native bottomland hardwood forest species, chosen by the USFWS and designed to restore the fully functioning natural system of the Red River NWR. Tree species include blackgum, sweetgum, persimmon, cypress, green ash, red mulberry, hackberry, cedar elm, bitter pecan, sweet pecan, willow oak, water oak, nuttall oak, shumard oak swamp chestnut oak, cherrybark oak, overcup oak, red maple and sycamore.

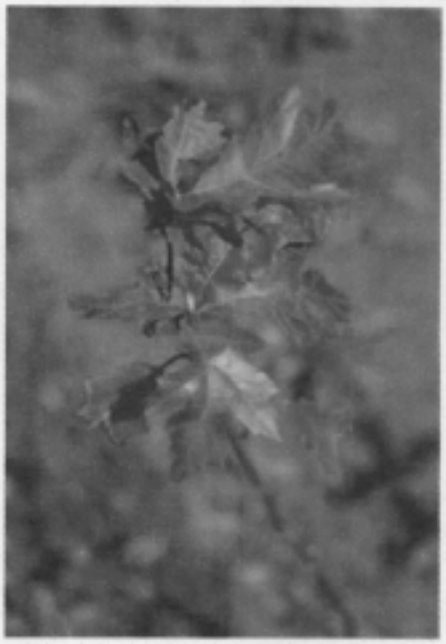

Figure 13: Cherrybark oak seedling

B1.5 Genetically Modified Organisms

All Go Zero projects are planted with natural, native trees. No genetically modified organisms will be used to generate carbon credits from this project.

B2. OFFSITE BIODIVERSITY IMPACTS

B2.1 Potential Negative Offsite Biodiversity Impacts

Biodiversity offsite will only benefit from this newly restored parcel of land as a result in the decrease in the negative effects associated with fragmented forestlands. All positive biodiversity impacts associated with the Go Zero Tract are extended offsite to adjacent USFWS-owned lands and the entire Red River NWR.

B2.2 Mitigation Plans

N/A

B2.3 Net Effect of Project on Biodiversity

In light of the above information, the net effect of the restoration of the Go Zero Tract on biodiversity will be highly positive on both the Go Zero Tract and Red River NWR as a whole.

B3. BIODIVERSITY IMPACT MONITORING

USFWS actively studies and monitors the biodiversity within Red River NWR boundaries. The CCP for Red River NWR is reviewed annually and revised according to changes in ecological conditions. The CCP will be augmented by additional management plans that address specific strategies in support of its goals. Revisions to the CCP will be subject to public review and NEPA compliance.

B4. NATIVE SPECIES USE

As previously stated in B1.2, and in accordance with the Fund's planting principles, all Go Zero carbon sequestration projects are planted with native trees.

B5. WATER AND SOIL RESOURCE ENHANCEMENT

The planting of native forests confers many benefits to soil and water quality. As described above, the Red River Restoration Initiative will result in improved water quality, both along Red River, the Atchafalaya River and the Gulf of Mexico. Soil, nutrient, and chemical inputs associated with agriculture will be reduced due to the lack of continued farming on the Tract. The replanted areas will also improve water quality by filtering and flushing nutrients, processing organic wastes, and reducing sediment before it reaches open water.

Restoration of the Go Zero Tract will also improve flood control and reduce soil erosion. Bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. Also, the soil quality will be healthier due to increased diversity of plant life and biomass accumulation associated with forest regeneration.

CONCLUSION

The Red River National Wildlife Refuge Restoration Initiative is a unique opportunity to restore Louisiana's native bottomland hardwood forests and help mitigate climate change while conferring community and biodiversity benefits to northern Louisiana. In addition to sequestering carbon dioxide from the atmosphere, the restored Go Zero Tract will benefit fish and wildlife, enhance water quality along the Red River and surrounding waterways, and create new areas for public recreation for all to enjoy.